

PATENT CLAIMS

1. A method for operating a fuel cell system for supplying at least one electric load with electric power, comprising at least one fuel cell and an energy storage device, and also a switching device for disconnecting and connecting the fuel cell system from/to the at least one load, characterized in that, by means of at least two switches (5a, 5b) of the switching device (5), the fuel cell (2) and the energy storage device (3) can be periodically connected and disconnected to and from the at least one electric load (4) independently of one another.
2. The method as claimed in claim 2, characterized in that, if more power than the at least one load requires is generated by the fuel cell (2), the energy storage device (3) is additionally connected in a pulsed manner in order to store the excess power.
3. The method as claimed in claim 1 or 2, characterized in that the energy storage device (3) is connected to the at least one load (4) at least whenever the latter requires electric power, and when the fuel cell (2) is not connected to the at least one electric load.
4. The method as claimed in claim 1, 2 or 3, characterized in that the energy storage device (3) is disconnected from the other components (2, 4) at least whenever voltage peaks occur when the fuel cell (2) is additionally connected, and is reconnected to the other components (2, 4) at the earliest when these voltage peaks have subsided.
5. The method as claimed in one of claims 1 to 4, characterized in that, when charging the energy storage device (3), in particular in the case of high charging power levels, it can be switched in a pulsed manner to the other components (2, 4), the duration of each power pulse being shorter than the duration of the discharge of an internal capacitance specific to the energy storage device (3).

6. The method as claimed in one of claims 1 to 5, characterized in that the energy storage device (3) is disconnected from the remaining components by the switch (5b) above and below predetermined threshold voltages.
7. The method as claimed in one of claims 1 to 6, characterized in that the switches (5a, 5b) are switched in such a way that the fuel cell system (1) is switched back and forth between different operating states, to be precise in such a way that an optimized operating range of the fuel cell system (1) with regard to power and efficiency is established on average over time.
8. The method as claimed in one of claims 1 to 7, characterized in that the switching frequency with which the switches (5a, 5b) are actuated is changed in dependence on the power required by the load (4).
9. A fuel cell system for supplying at least one electric load with electric power, comprising at least one fuel cell and an energy storage device, and also a switching device for disconnecting and connecting the fuel cell system from and to the at least one load, characterized in that the switching device (5) has at least two switches (5a, 5b), so that the fuel cell (2) and the energy storage device (3) can be disconnected and connected from and to the at least one electric load (4) independently of one another.
10. The fuel cell system as claimed in claim 9, characterized in that the switching device (5) comprises at least one further switch (16), with which the at least one electric load (4) can be disconnected and connected from and to the further components (2, 3).
11. The fuel cell system as claimed in claim 9 or 10, characterized in that the energy storage device (3) comprises at least one battery.

12. The fuel cell system as claimed in claim 9, 10 or 11, characterized in that a charge store (17) is connected parallel to the electric load (4).
13. The fuel cell system as claimed in claim 12, characterized in that the further switch (16) is arranged between the charge store (17) and the further components (2, 3), so that the charge store (17) and the at least one electric load (4) are always connected.
14. The fuel cell system as claimed in claim 12 or 13, characterized in that the charge store (17) is formed as a supercap.
15. The use of a method as claimed in one of claims 1 to 8 and/or of a fuel cell system as claimed in one of claims 9 to 14 in a mobile fuel cell system (1), in particular in a motor vehicle.